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THE RELATIONS OF MIND AND MATTER.

BY CHARLES MORRIS.

(Continued from p. 857, September number.)

V. THE CONDITIONS OF CONSCIOUSNESS.

THE greatest mystery of the universe is the mystery of consciousness. That we can ever understand its innate nature is not to be expected. The mind may measure everything outside itself, but it cannot measure itself. The eye sees everything except the eye. There must always remain one thing unknown; that to and by which everything else is known. But though the nature of consciousness may be beyond our ken, its relations to matter and the mind are not necessarily so. Some of these relations are apparent. Others are within the reach of conjecture. We are therefore free to consider the mystery of consciousness from this point of view.

The character of consciousness has undoubtedly been greatly misapprehended, even by some very acute thinkers. It is customary to talk and write as if consciousness and mind were identical, or as if the words thought and consciousness were synonymous. It is, indeed, on this ground that the brain-mind theorists have based their deductions. They find that the existence of consciousness and the loss of brain force are closely related. Thought bears heavily upon the nerve cells. They sink beneath its pressure, lose their organization and yield energy, of which there is no evident physical display. This energy, as is claimed, is the element of consciousness, and its successive manifestations constitute the mind. But this amounts to a distinct claim that the consideration of the origin of consciousness involves that of the whole mental constitution, and that thought and the conscious perception of thought are one and the same thing; a hypothesis which may safely be disputed. For the mind impresses us with a sense of unity and continuity which certainly do not belong to consciousness. Its thoughts continue to exist, whether or not we are conscious of their existence. A thought may arise to our mental perception to-morrow, another next year, a third only after a decade of years. But they are evidently the same thoughts that we formerly knew. Their loss to sight has had no effect on their persistent existence. The action of consciousness or mental perception is, in fact, singularly like that of the eye. We per-

ceive to-day a landscape which we saw twenty years ago. There it has lain unchanged, all its salient points familiar to our sight, though we may have since wandered over half the world. So the eye of the mind wanders over a world of thoughts and suddenly perceives a mental landscape of which it lost sight twenty years before. There it lies, far more unchanged even than the physical landscape, for that has suffered innumerable changes, while the mental picture has seemingly remained utterly free from influences of change.

Whether consciousness is an energy in itself, or a forceless side product of energy is a question that has been considerably debated. Professor Huxley takes the latter view, and declares that consciousness is not an agent in determining action, but is a collateral result of the action. Professor Cope considers that "consciousness is not a necessary condition of energy," though "energy is a necessary condition of consciousness,"¹ and differs from Huxley in believing that consciousness exerts a directing influence over mental action. In respect to these views it is important to observe that the mental operations which are generally attended by consciousness are capable, in some cases, of proceeding unconsciously. There are on record many striking instances of the active operation of the mind during unconsciousness, or while consciousness was elsewhere directed, important results of reasoning being sometimes produced. There are few thinkers to whom minor instances of this kind have not occurred. Such cases would seem to prove that consciousness is not a necessary element of thought, and therefore not a determining agent in thought. On the other hand it must be remembered that such mental processes never begin in unconsciousness. In every recorded case they have been trains of thought with which consciousness was at first actively concerned, and whose movement has proceeded during a temporary lapse of consciousness, their final results again rising into the realm of conscious thought. Instances of this kind, however, are comparatively few, and seem only to occur where the preliminary train of thought has been intense, and the conscious attention close and active. This intense activity seems to set in movement energies of the mind, which, like a train of wheels set in motion by the hand, run on for some time after the acting agent has been withdrawn, and only slowly

¹ On Catagenesis, AMERICAN NATURALIST, Oct., 1884.

sink into a state of rest. There is not a shred of evidence that such mental movements ever take place without the preliminary attendance of consciousness. They may possibly be produced in a minor degree by less energetic consciousness, but in every case they soon sink to rest, as friction brings wheels to rest when their moving force is withdrawn. And the mind, no more than the wheels, seems capable of starting into activity without the aid of some directing agent.

There is nowhere in physical science evidence of the possible existence of a side product of energy which is not itself an energy. Motor energy varies in its mode of action, but every variant has a force influence of its own. A current of electricity, for instance, when resisted in its passage, here yields heat, there light and there magnetism, but the electricity loses in vigor with every such side expression, and the heat, light or magnetism at once exert force. The flash of light which gleams out when the electric current passes through the air, signifies a conversion of part of the current into the vibratory motion of light. May not the flash of consciousness which gleams out on the passage of motor energy from brain to mind signify a like partial side conversion of this energy? And if so it may possibly produce effects of its own, calling the mental organism into activity, or exerting some directing force upon the mental activities, as Professor Cope holds.

Under the hypothesis here advanced, that the brain is not the organ of the mind, but that there exists a distinct mental organism separate from though intimately related to the brain, the conditions of this organism must be closely analogous to those of all organized masses. We may, therefore, compare the mental organism with the crystal of some mineral. The latter is persistent, its internal relations of motion and attraction being in exact harmony. If undisturbed its internal conditions would remain unchanged indefinitely. But the motor energies of the external world penetrate the crystal and may disturb its organizing motions, producing changes in the relations of its particles. So a seed under conditions of isolation is a persistent organism, held intact by the harmony of its internal energies. Exposed to the inflow of external energy its organization changes. The instigating touch of such inflowing energy may set up long continuing changes in the motor relations of the particles of the seed,

and cause important modifications in its constitution. These cases seem closely analogous to what we know of the constitution of the mental organism, though the susceptibility of the latter to external influences is far greater. Yet it has a fixed organization through the harmony of its internal energies. It is exposed to the inflow of external energies through the medium of the brain. And its internal conditions change under the influence of these inflowing energies. But at every resting stage of its development it gains a stable condition of internal energies, which remains persistent during the temporary absence of consciousness. And consciousness appears to be a peculiar expression of the motor energy which flows from the brain into the mind. The nerve current appears to produce chemical disintegration in some highly unstable element of the brain cells, as in the muscle cells. The energy set free by this disintegration seems merely to intensify without changing the character of the influence producing it. It flows into the mental organism, and in so doing takes on the special condition of consciousness, or manifests consciousness as one of the effects of its intact with the mind. Its final effect, however, is to impress the mind with a new motor state, which directly or indirectly repeats the conditions of the instigating external energy.

If such be in any sense a correct conception of the character and relations of the mental organism, certain other necessary consequences follow. Not only does the mind receive energy from the brain, but its innate energies affect the brain, and set up disintegration in its cells like that produced by the nerve current. And the energy produced by this disintegration flows out as a nerve current over the motor nerves to the muscles, which it rouses into activity.¹ Such is the two-fold relation of the mind to external nature. But it has interrelations of its own. Thought energies flow from part to part of the mental organism, and ideas are evolved from their interconnection, much of the mental evo-

¹ The indications are that external energy does not flow directly into the mind, nor does mental energy flow outwards. In both cases an intermediate energy is used, that set free by chemical change in the tissues of the brain. The inflowing nerve current induces this change, and the mind is affected by the energy thus set free. In like manner the mind does not emit energy, or only to the slight extent necessary for inductive action. It exerts force on the brain cells, and induces a special emission of nerve energy. It constantly receives, but it never yields its stores of motor energy. It resembles a land-locked lake, into which hundreds of streams flow, but to which there is no outlet.

lution taking place through the interchange and combination of these internal energies. Yet the conditions of this activity seem identical with the other activities described. The mental organism has no more power of arbitrarily changing the relations of its own energies than has a crystal. All such changes arise through its connection with an external reservoir of energy, the brain. The seeming movements of thought through the mind are really actions of the energies of thought on the brain, the release of brain energy, and the inflow of this energy into another region of the mental organism. This mediation of the brain is signified by the physiological change that takes place, and also by the appearance of consciousness, a condition which seems only existent during motor interconnection of the brain and the mental organism.

We may reiterate here the fact that no organized mass—crystal, seed, solar system or mind—is capable of setting up new actions within itself, or arbitrarily instigating changes in its conditions of motor equilibrium. Such an action would be quite as impossible, if we may offer a homely illustration, as the old problem of a man lifting himself in a tub. Organizing motions cannot possibly change of themselves. Perturbations may arise through their interaction, as between the bodies of the solar system, but not permanent changes. And by the very conditions of their existence they resist change. All permanent change must come from the inflow and action of external energy, and it will be resisted to a degree in accordance with the rigidity of the organism. In the crystal, for instance, the resistance is vigorous. In the mind it is much less so, and varies extremely in minds of different degrees of development. If all mental change was produced by external impulse, then the brain might be its organ. But the existence of internal mental change renders this impossible. Such change can only take place under the instigation of external energy, and the brain is the source of this energy. The thoughts which seem to flow from region to region of the mind, evidently do so through the intermedium of the brain, since all activity of thought is attended with chemical change in the brain cells. And the energy thus yielded is the active agent in the new idea formed. It would seem as if every rapport between brain and mind instigated oxidation in the brain cells, the energy yielded flowing to the muscles, or to another region of the mind,

over the brain fibers, on the same principle as external energy penetrates to the mind over these fibers. In this view the mental organism has a space extension, equivalent to that of the cerebrum, and each region bears a relation like that of external nature to every other region.

The vividness of consciousness seems closely related to the degree of disturbance which it produces in the conditions of the mental organism. Energetic sensory impressions seldom fail to arouse consciousness, even if the mind is otherwise active. Less energetic ones may fail under such conditions. It is not unusual to discover that impressions have been unconsciously received during a period of mental abstraction. Possibly the movement of thought processes during unconsciousness is due to the small volume of energy engaged. An important fact, in this connection, is that unusual impressions arouse the consciousness more quickly and vividly than usual ones. The mind seems to become dulled to a sensation when it has become habituated to it. With every repetition of any special current of energy it seems to create less disturbance in the mind. This may be partly due, if the sensation is one to which immediate motor response is requisite, to the drafting off of part of the energy to the muscles. But even where this is not the case, and the impression is made wholly on the mind, its intensity diminishes with repetition, while all unusual sensations at once arouse active consciousness. Usual ones can only regain their original intensity of influence by an increase in their vigor. It would appear as if the vividness of consciousness depended upon the degree of change produced by a sensation in the mental conditions, and that each habitual sensation found accordant mental conditions, and therefore feebly affected the mind, while every new one produced a degree of change in accordance with its degree of rarity.

There is good reason to believe that every sensation that reaches the mind, however frequently repeated, is capable of awaking consciousness, and that only the completely reflex mental currents are absolutely unconscious. Thus certain tastes and sounds may be received with full consciousness an indefinite number of times. Yet with this rule the other holds good that an unfamiliar sensation most vividly arouses consciousness, and that all sensations less sharply affect the attention as they grow familiar. In all cases of the kind in which a sensation is seemingly

received unconsciously, this is due to the activity of the attention in some other direction. But if the attention is disengaged, every sensation may produce consciousness, no matter how familiar a visitant it may be to the mind.

The fact that when the mind is actively conscious in one direction it may be unconscious of the operation of important movements previously set up within its organism, or of the reception of new sensations, seems to indicate that the volume of consciousness which may exist at any one time is limited. It may sink below this volume, even to complete disappearance during inactivity of the brain, but it cannot rise above it. And the variations in the distribution of this volume of consciousness are of the utmost interest and importance. Now it seems to diffuse itself, and a broad field of the mind is perceived, the central ideas in the field of vision being clear, while others crowd more faintly in, like dimly-seem objects which crowd in at the sides of the eye. Now it becomes concentrated, and only a few, or perhaps only a single idea is very vividly perceived if the powers of inward vision are acting with energy. And while, as a rule, sensations arrest the attention much more vividly than thoughts, this does not always hold. In some cases of mental diversion the most vivid sensations pass unperceived.

This phenomenon of concentrated vision, as applied to the mind, has very important consequences. For the mind is utterly inactive except when energized by consciousness, and only that portion of it is active which is so energized. And as the activity of the mind governs the movements of the body, it follows that our voluntary actions, of whatever kind, are controlled, not by the mind as a whole, but by that portion of it which is active. This undeniable principle produces certain strange and important consequences. Ordinarily a certain number of our ideas are active, and particularly those deep-lying and firmly-based mental impressions and hereditary mental conditions which, acting together, constitute what we call judgment, or common sense. But there are several normal and some abnormal states in which this condition is changed.

One of these is in the case of strong emotion. As an earnest desire fixes the eye intently upon some single object, and causes eye and mind alike to ignore what lies beyond this object, while all the movements of the body are in response to the desire; so

an energetic emotion fixes the eye of the mind upon some single thought, while all the remaining conditions of the mind fade and vanish from sight. In such a case judgment or reason no longer governs our actions, for the group of mental conditions which constitutes these faculties is dormant. In deep grief the person affected yields utterly to his sorrow, and cannot be aroused from his depression. In intense fear no powers of reason remain to control the movements. In violent anger only the idea of revenge upon the object of that anger may remain. The furious man is, in a certain sense, irresponsible. His mind is an arrow moved by a single string. It discharges itself upon the obnoxious object, for there is no controlling force to restrain it. It is only when the paroxysm of emotion has passed away, and consciousness again spreads its revealing vision over the broad field of the mind, that other mental conditions spring into action, and deep remorse may follow an impulsive deed which was committed while all the springs of reason were dried up by the consuming heat of passion. As to the question whether a person is morally responsible for acts committed in such a state, it can only be answered, that every person is under moral obligation to bring his emotions under the control of his reason. The habit of unchecked indulgence in emotion or passion may lead to as serious consequences as the formation of any other bad habit.

A second normal mode of mental concentration, utterly differing from the above, is that known as reverie. In this the consciousness is not fixed upon one thought. It wanders freely from thought to thought, and its partial concentration is a result of inactivity instead of emotional energy. The mind is closed against impressions from without, and is also closed against the great mass of its internal stores, from the simple inactivity of consciousness. The circulation becomes sluggish. The waste of brain tissue is decreased. Only a slight degree of nerve energy flows into the mind, and only a few of its countless store of ideas are aroused to activity. And the consciousness is not concentrated upon these. It flows freely over the links of association.

The dreaming state is merely an intensification of this state of reverie. Now the circulation is reduced to its lowest point. Exterior impressions, except they be very violent or very unusual, fail to affect the mind. The inner store of ideas is alike inactive. In its extreme state this produces dreamless sleep. But in a less

extreme case the mind is partially active. Some oxygen visits the brain. The wasted nerve tissue is being reproduced. Conditions arise in which oxygenation feebly takes place, and the free energy of the nerve cell is given off. These conditions may arise under the influence of some impressions upon the nerves of sense, or under that of some intimate connection between a locality of the mind and a reorganized region of the brain. In either case a slight degree of energy flows into the mind, so slight that only a very limited field of thought becomes active. The results are very striking. These few active thoughts form our whole mental world. There is no force of exterior sensation or of interior judgment to control them. The most absurd conceptions seem to us to be actual facts. Its most vivid perceptions are in every case facts to the mind. Ordinarily these are sensations of outward objects. But where sensation is at rest the dominant idea assumes the appearance of an external reality. And where judgment is at rest the incongruity of an idea with actual facts may remain unperceived, though even in dreams absurdity becomes apparent, as though the judgment were partly aroused.

There are other characteristics of the mental organism which aid in assimilating it to physical organisms. It impresses us as if subject to variations of temperature. Its emotional states lead to the conception of hot or cold states, and the effects which they produce are very interesting. Thus fear or terror impresses us as a chill of the mental organism. And its effects are singularly like those of cold on the body. The latter when chilled becomes sluggish, dull, torpid, strongly predisposed to sleep. Intense fear in animals yields similar effects. They grow paralyzed, as it were, torpid or inactive in condition, and probably with dulled sensibility to pain and a general inactivity of consciousness. The condition of the seemingly charmed bird is probably of this character.¹ On the other hand passion is a state of heat. Its effect is to instigate excessive activity, violent movements, vivid consciousness.

¹ "Fear, alarm, terror, horror, in their major degrees at least, frequently paralyze all power of self-preservative action, creating a dangerous immobility of body, with an accompanying fixity of stare. This condition is often described as a kind of fascination, of which the main features are powerlessness of mind and body, with the gaze helplessly fixed on some dreaded object, generally some powerful enemy, such as a serpent. * * * In a minor degree fear may beget stupidity or mental confusion, leading to injudicious or useless action." Lindsay's *Mind in the Lower Animals*, II, 235.

Between the extreme states we have the condition of pleasure, in which the mind seems gently warmed, and of gloom or depression, in which it seems similarly chilled.¹ The reasoning power is most efficient in calm states, when the temperature is normal. Then consciousness is diffused and its vision extended. In the other conditions it becomes more concentrated, until, in extreme heat or chill, a single idea or feeling dominates the mind.

We have not space here to consider the more aberrant conditions of mentality, such as somnambulism, hypnotism, insanity, &c., and the various strange phenomena which attend injury to the brain. None of them are incongruous with the idea that the mind is a distinct organism, and the brain its instrument of activity. Nor can we consider the many interesting relations of thought to thought or memory to memory, and the interaction of memories which lie at the basis of the evolution of ideas. Many of these are highly interesting and peculiar, yet there is nothing in them inconsistent with the hypothesis we have advanced. It will suffice to say that no thought ever calls up another unless they are directly or indirectly related, or associated in time or place of reception. It may be said, however, that our ideas differ widely in their degree of fixity in the mind and influence over its movements. Below all, as the basis of the organism, lie a series of deeply-based hereditary conditions, gained during ages of mental development. These are very persistent, and strongly resist warping influences. And the effort to perform any action inconsistent with them is vigorously resisted, even though we may be very faintly conscious of the source of the resistance. The mental development obtained during youth is also deeply based, and actively resists the warping influence of later impressions. The later the impression in date of reception the less firmly does it seem implanted, as if these late impressions were but slight and superficial affections of the more deep-laid early stages of development.

¹ "In certain animals there is occasionally a perfect 'wildness of joy,' great intensity of mental excitement from pleasurable emotions. Thus Darwin speaks of the 'madness of delight' in a stickleback, meaning, no doubt, exuberance of joy, or uncontrollable animal spirits." *Ibid*, II, 233.

Thus strong pleasure seems to produce general activity of mind and body, while deep grief or depression from any cause produces sluggishness and inactivity of consciousness, just the effects which would naturally flow from states of heat or chill in a physical organism.

In this connection a consideration of great importance and interest arises. It is certainly a singular fact that in the very exact transmission to the germ of minute features in the physical organization of the parent, the mental organization is never transmitted except in its basic characteristics. Every organ of the body is reproduced, with all its powers inherent. The cerebrum is reproduced and develops in company with the other organs. The fact that these organs are functionally copies of those of the parent proves that the reproduction is not only of material form but of the parental motor conditions. This equally applies to the cerebrum, whose motor conditions should fully reappear in its development. Yet if these motor conditions are the powers of the mind they certainly do not reappear. In every individual a new mind has to be built up. The body, cerebrum and all, may attain its full development and the mind remain in its germinal state. Evidently it is a constituent of the individual alone, and not a something that may be hereditarily transmitted. The character of the cerebrum limits and controls the extent and direction of the mental development, and imposes certain hereditary characteristics on its primary phases of unfoldment, but not a trace of the special mentality of the parents reappears in the child. This indicates that the mind is the property of the individual alone, in whose life it is developed, and whom it may survive. The whole physical frame, including the cerebrum, is represented in the germ, but the mental organism is never transmitted. This is certainly a fact of high significance.

The condition of emotion is one that seems analogous to conditions existing in every organism. It appears to be a state of heat or cold, strong passion, for instance, being an intensely heated state, and deep fear a state of shuddering chill. The mind has also its attractions and repulsions, and these seem to be closely concerned with its activities. Very many of our movements are directly due to drawings in some direction or towards some object, or repulsions from some object. The motives which govern our movements are very frequently motives of attraction or distaste, and with these motives some degree of the emotional state usually exists, a slight warmth in the case of attraction and a chill in the case of repulsion. Possibly some condition of these agencies is concerned in the changing relations of the mind to the brain, and may be the motor influence by which contact is effected,

energy set free and consciousness called into existence. In this connection attention may be called to Mr. J. S. Lambard's experiments on heat conditions during mental action. He found that emotion had far more influence than thought in this direction. A few minutes self-recitation of emotional poetry yielded more heat than several hours of deep thought. In the latter case the energy set free seems to have been employed in mind development. If the poetry was spoken less heat appeared. Here energy was used in muscle movement.

The considerations here taken in regard to the conditions of consciousness, and the relations of energy to the mental organism, seem to lead to the conclusion that every organized mass, when its internal relations become disturbed by the inflow of discordant external energies, must feel some influence more or less closely allied to consciousness. But if the vividness of consciousness in any sense depends upon the mobility of the organism, and the extent of the disturbance produced in its internal conditions, then it may pass through many degrees of unfoldment, from an excessively vague and generalized effect to the sharply specialized condition of human consciousness. In every case there is resistance to change. But in a rigid crystal the resistance is very great, while in a mobile mind it may be excessively slight, and disturbance of conditions be produced by influences of the utmost delicacy. It must be borne in mind, however, that in man consciousness accompanies action of energy on the mental organism only. Action upon the muscles, though yielding equal disturbance, is never attended by consciousness. Thus the peculiar conditions of substance which occur in the mental organism may be absolute requisites to this effect. It is also requisite to consciousness that the inflowing energies shall act only to modify the motor conditions of organization, not to produce disintegration, or to disseminate themselves as generalized motions.

With the lowest animals consciousness must be exceedingly vague and inactive. Their sensitiveness is undeveloped, their sense organs in embryo, the conditions to which they are exposed nearly unvarying. Most of their actions must be reflex. Yet some feeling of every new mode of impression must be experienced, and this feeling attends and perhaps aids in every step of upward evolution. The frequency and activity of consciousness

increases as we ascend in the animal scale. And what was once conscious condition falls steadily back into the realm of the unconscious, as higher stages of this activity arise. Yet even in lower man consciousness is dull in action and limited in range as compared with civilized man. Customary actions and thoughts tend to lose all sharpness of conscious definition, and the customary rules far more supremely in lower men and in the brute realm than in the world of civilization.

By this dulling of customary sensations consciousness is constantly set free for superior labors. It is actively exerted in getting a firm grasp on every new condition presented to it. But this once gained, attention is set free and reaches outward and upward. The new acquisition sinks deep into the mind, to be recalled at intervals, and perhaps in time to become a constituent part of the mental constitution. In the case of the child learning to walk, for instance, consciousness is vividly concentrated upon its efforts. But the movement once gained the attention is set free for devotion to other things, and the motion of walking may finally be performed unconsciously. Numerous other instances of this kind might be adduced, leading up to that often quoted and extraordinary one of the nearly or quite unconscious action of the fingers of the pianist.

In regard to mental labors the same rule applies. We are constantly exercised in observing new facts, imagining new conditions, forming new ideas. Each addition to our mental stores occupies the consciousness more or less exclusively until it becomes an habitual occupant of the mind, after which the attention is released for devotion to new labors, and the idea thus gained sinks back into the fabric of the mind. It may be recalled at will, but it no longer has a despotic control of the consciousness. In this upward progress of the mind we are often inclined to believe that the superiority of higher man is intellectual only, and that in regard to acuteness of the senses he has fallen behind the savage. Yet this is not the case. He may have lost acuteness in respect to distant vision, or sharpness of hearing, but his sensitiveness has grown far more diversified. He can see countless delicate shades of color and variations of form, can appreciate the most minute variations of musical tone, can distinguish delicate changes of odor and taste of which the savage is utterly incapable. His senses have thus become excessively more delicate and

varied in their powers, and his mind responsive to a greater variety of impressions.

It is in his ideas, however, that civilized man so greatly overtops the lower world of life. His mind has been for ages pushing deeper and deeper into the realm of the unknown like an eating sea that is cutting its way steadily into the land. Before it lies the unknown, stretching away into the infinite. Behind it lies the known, half or wholly buried beneath the shrouding waters of the sea. The surf line is the line of consciousness, the border between the known and the unknown. Here consciousness mines forever into the coast line of facts, letting every new-gained fact float out to come to rest on the quiet sea bottom, the stores of recent memory lying half visible in the shallow waters, while in the deep sea beyond lie the layers of ancient acquirement which have become to us hereditary capabilities, the native stuff of the mind. What new and deeper powers the senses may yet attain, what new susceptibility the mind, cannot be said. We see rising dimly and shapelessly around us new phenomena, new stuff for thought on which the mind of future man must work, and every new age may safely say to the ages of the past: "There are more things in heaven and earth, Horatio, than are dreamed of in your philosophy."

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A BRIEF BIOGRAPHY OF THE HALIBUT.

BY G. BROWN GOODE.

THE halibut, *Hippoglossus vulgaris*, is widely distributed through the North Atlantic and North Pacific, near the shores, in shallow water, as well as upon the off-shore banks and the edges of the continental slope down to the depth of at least 400 fathoms. The species has not been observed in the Western Atlantic south of the fortieth parallel; stragglers have occasionally been taken off Sandy Hook, Block island and Montauk point. It ranges north at least to Cumberland gulf, latitude 64°, to Holsteinborg bank in Davis' strait, and as far as Disko and Omenak fiord, latitude 71°, on the coast of Greenland, five or six degrees within the Arctic circle. It occurs along the entire west coast of Greenland, and is abundant about Iceland and at Spitzbergen, in latitude 80°. No one knows to what extent it ranges along the European and Asiatic shores